

### CLAIMS

1. A tubular microstructure comprising an assembly of nanoparticles having surface functionality capable of self-bonding.
2. A tubular microstructure according to claim 1, wherein the surface functionality is hydroxy functionality.
3. A tubular microstructure according to claim 1, wherein the nanoparticles comprise metal oxide.
4. A tubular microstructure according to claim 1, wherein the nanoparticles comprise titanium dioxide.
5. A tubular microstructure according to claim 1, wherein the nanoparticles comprise aluminum oxide.
6. A tubular microstructure according to claim 1, wherein the nanoparticles comprise zinc oxide.
7. A process for producing microtubes from nanoparticles, said process comprising forming a dispersion of the nanoparticles in a liquid phase; and freeze-drying the dispersion to produce microtubes;  
wherein the nanoparticles comprise surface functionality capable of self-bonding and bonding with the liquid phase during freeze-drying.
8. A process for producing microtubes from nanoparticles having surface hydroxy functionality, said process comprising dispersing the nanoparticles in a hydrogen-bonding liquid; and freeze-drying the dispersion to produce microtubes;  
wherein concentration of the nanoparticles in the hydrogen-bonding liquid ranges from 0.0025 to 0.0625 g/ml.
9. A process according to claim 8, wherein the nanoparticles comprise metal oxide.

10. A process according to claim 8, wherein the nanoparticles comprise titanium dioxide.
11. A process according to claim 8, wherein the nanoparticles comprise aluminum oxide.
12. A process according to claim 8, wherein the nanoparticles comprise zinc oxide.
13. A process according to claim 8, wherein the hydrogen-bonding liquid comprises water.
14. A process according to claim 13, wherein pH of the dispersion ranges from 1.8 to 2.8.
15. A process according to claim 13, wherein pH of the dispersion ranges from 1.9 to 2.7.
16. A process according to claim 13, wherein pH of the dispersion ranges from 2.0 to 2.6.
17. A process according to claim 13, wherein pH of the dispersion ranges from 2.1 to 2.5.
18. A process according to claim 13, wherein pH of the dispersion ranges from 2.2 to 2.4.
19. A process according to claim 8, wherein average particle size of the nanoparticles ranges from 10-30nm.
20. A process according to claim 8, additionally comprising centrifuging the dispersion and freeze-drying a supernatant portion of the centrifuged dispersion.

21. A process for producing microtubes from nanoparticles having surface hydroxy functionality, said process comprising
- forming a dispersion consisting essentially of the nanoparticles in a hydrogen-bonding liquid; and
- freeze-drying the dispersion to produce microtubes;
- wherein concentration of the nanoparticles in the liquid ranges from 0.0025 to 0.0625 g/ml.
22. A process according to claim 21, wherein the hydrogen-bonding liquid comprises water.
23. A microtube produced by the process of claim 8.